Book Review: Sustainable Food Systems in Sub-Saharan Africa: Plant Derived Nutritious Foods[1][2]

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Bibliographic and Publication Background of the Volume

The edited volume *Sustainable Food Systems in Sub-Saharan Africa: Plant Derived Nutritious Foods – Volume 1* was published by Springer Nature Switzerland in 2026 as an open-access scientific publication. The book was edited by Bal Ram Singh, Liveness Jessica Banda, Andy Safalaoh, Agnes Mwangwela, Ruth Haug, Lars Olav Eik, Jennifer Joy West and Rattan Lal, representing leading institutions in Norway, Malawi, and the United States. The publication forms part of a broader initiative aimed at advancing sustainable food systems and improving food and nutrition security in Sub-Saharan Africa. The volume contains 574 pages and 28 chapters organized into five major thematic sections, bringing together the work of more than 110 scientists from Africa, Europe, Asia, and North America. The book is freely accessible under a Creative Commons Attribution 4.0 International License, reflecting its intention to contribute to both scientific advancement and practical development efforts.

Introduction

Food security, agricultural sustainability, and climate resilience have become central concerns in contemporary international development discourse. These challenges are particularly pronounced in Sub-Saharan Africa, where rapid population growth, environmental degradation, climate variability, and persistent poverty continue to threaten agricultural production and nutritional wellbeing. The edited volume *Sustainable Food Systems in Sub-Saharan Africa: Plant Derived Nutritious Foods* addresses these interconnected challenges through a multidisciplinary examination of food systems, agricultural innovation, soil management, nutrition, and policy interventions.

The volume emerges from the FoodMa Programme, a collaborative initiative between the Norwegian University of Life Sciences and the Lilongwe University of Agriculture and Natural Resources. As outlined in the preface, the programme sought to identify and disseminate technologies and practices capable of enhancing the

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productivity, resilience, and nutritional quality of smallholder farming systems in Sub-Saharan Africa. Rather than focusing solely on agricultural yields, the book adopts a broader food-systems perspective that incorporates nutritional security, environmental sustainability, social inclusion, and climate adaptation.

The Editors

The scientific quality of the volume is strongly supported by the expertise of its editors. Bal Ram Singh, Professor Emeritus at the Norwegian University of Life Sciences, is internationally recognized for his work on soil fertility, tropical agriculture, and carbon sequestration. Rattan Lal, Distinguished University Professor at The Ohio State University and recipient of the 2020 World Food Prize, is one of the world's leading authorities on soil health and climate-resilient agriculture. Ruth Haug contributes extensive experience in food systems, food security, agricultural policy, and international development.

The editorial team is further strengthened by the contributions of Agnes Mwangwela, Liveness Jessica Banda, and Andy Safalaoh from the Lilongwe University of Agriculture and Natural Resources, whose research backgrounds encompass food science, animal science, nutrition, and sustainable agricultural development. Collectively, the editors represent a broad range of disciplinary perspectives that are reflected throughout the volume.

Structure of the Volume

The volume is organized into five thematic sections: *Plant Food Systems and Innovative Technologies*; *Nutrient-Dense and Biofortified Food*; *Soils, Climate Change and Carbon Sequestration*; *Policy Formulation and Implementation for Smallholders*; and *Prospects of Green Revolution and Research Perspectives*. This structure allows readers to progress from the biophysical foundations of food production toward broader socioeconomic and policy considerations. The arrangement also reflects the editors' intention to present food systems as interconnected networks involving soils, crops, nutrition, governance, and rural livelihoods.

Plant Food Systems and Innovative Technologies

The first thematic section examines agricultural innovations that can contribute to sustainable food production under increasingly challenging environmental conditions. The chapters emphasize that food systems in Sub-Saharan Africa remain heavily dependent on a limited number of staple crops despite the region's rich agro-biodiversity. The contributors argue that improving food security requires not only increasing production but also strengthening the sustainability and resilience of agricultural systems.

Several chapters focus on soil fertility management, highlighting integrated nutrient management, biological nitrogen fixation, and improved nitrogen use efficiency as

critical factors in enhancing crop productivity. Studies on Bambara groundnut cultivation and lowland rice production demonstrate the potential of biologically based approaches to reduce dependency on external inputs while maintaining yields. The volume also devotes considerable attention to biochar technologies, presenting empirical evidence from Malawi, Ethiopia, and Tanzania. These studies suggest that biochar can improve soil health, increase crop productivity, and contribute to climate resilience through enhanced water retention and nutrient availability.

The section concludes with a comprehensive review of agroecological practices in Malawi. Rather than promoting conventional intensification alone, the authors advocate agroecological approaches that integrate ecological processes, local knowledge, and sustainable land management. This perspective distinguishes the volume from many agricultural development publications that prioritize productivity gains without equally considering ecological sustainability.

Nutrient-Dense and Biofortified Food

The second thematic section addresses one of the most pressing yet often overlooked dimensions of food security: nutritional quality. The contributors emphasize that food insecurity in Sub-Saharan Africa is not merely a question of caloric insufficiency but also of widespread micronutrient deficiencies, particularly deficiencies in iron, zinc, iodine, and vitamin A.

The chapters examine the potential of biofortification and nutrition-sensitive agriculture as strategies for addressing hidden hunger. Particular emphasis is placed on the soil–plant–animal–human nexus, illustrating how soil health directly influences crop nutrient content and, ultimately, human nutrition. The volume highlights the role of biofortified crops and nutrient-rich traditional foods as cost-effective approaches for improving public health outcomes.

Another important contribution of this section is its integration of agroecology and nutrition. Rather than treating agricultural production and human health as separate fields, the authors demonstrate their interdependence. This integrated perspective broadens the understanding of food security and aligns with emerging international debates on sustainable and healthy food systems.

Soils, Climate Change and Carbon Sequestration

The third section forms one of the intellectual cores of the volume. It focuses on the interactions between soil management, climate adaptation, and environmental sustainability. Drawing heavily on contemporary soil science and climate research, the chapters demonstrate that soil health is fundamental not only for agricultural productivity but also for climate change mitigation and adaptation.

The chapter on climate adaptability and soil carbon sequestration highlights the capacity of improved soil management to enhance resilience while simultaneously contributing to greenhouse gas mitigation. Complementing this perspective, the chapter

on agroforestry innovations presents evidence that integrating trees into farming systems can improve soil fertility, biodiversity, and climate resilience.

Several contributions are based on empirical studies conducted in Malawi and Kenya. Research on in-situ rainwater harvesting demonstrates how relatively simple water management techniques can strengthen farmers' adaptive capacity in drought-prone environments. Similarly, the chapter on integrated landscape management presents a landscape-scale approach to sustainable land management that seeks to reconcile agricultural production with environmental conservation.

A particularly valuable feature of this section is its attention to indigenous vegetables and local adaptation strategies. By recognizing local knowledge and underutilized crops, the authors challenge the assumption that agricultural modernization must rely exclusively on external technological solutions.

Policy Formulation and Implementation for Smallholders

The fourth thematic section shifts attention from biophysical systems to institutional and social dimensions of agricultural development. The contributors investigate how policies, extension systems, gender relations, and market structures influence the adoption of sustainable agricultural practices among smallholder farmers.

The chapter entitled *The Legume Pendulum* provides a detailed analysis of the role of legumes in improving both food security and household income in Malawi. Other contributions explore intrahousehold gender relations, demonstrating how access to productive resources remains shaped by gender inequalities. These findings highlight the importance of considering social structures when designing agricultural interventions.

Several chapters evaluate extension services and farmer-centred innovation approaches. The authors argue that sustainable agricultural transformation depends not only on technological innovation but also on effective knowledge dissemination and participatory learning processes. The chapters on communication channels and farmer field schools provide particularly useful insights into how information regarding climate-smart agriculture can be transmitted more effectively to rural communities.

The section also includes analyses of improved maize varieties, land rental markets, and commercial agriculture. Collectively, these studies demonstrate that agricultural sustainability is closely linked to institutional arrangements, access to information, and equitable participation in rural development processes.

Prospects of Green Revolution and Research Perspectives

The final thematic section adopts a more synthetic and forward-looking perspective. The chapter *Road Map to Promoting Green Revolution in Sub-Saharan Africa* revisits the concept of the Green Revolution within contemporary sustainability debates. Unlike earlier models that emphasized intensive input use, the authors propose a soil-centred and environmentally sustainable transformation pathway. Soil health, biodiversity

conservation, climate adaptation, and farmer participation are identified as central pillars of future agricultural development.

The concluding chapter on research gaps and future perspectives provides a particularly valuable contribution. It identifies several areas requiring further investigation, including the long-term impacts of climate adaptation strategies, the nutritional consequences of agricultural interventions, the genetic improvement of indigenous crops, and the development of integrated food-system models. These reflections not only summarize the book's findings but also establish a future research agenda for scholars working in the field of sustainable food systems.

Assessment of the Scholarly Literature

One of the volume's major strengths lies in its extensive and multidisciplinary scholarly foundation. The chapters draw upon research from agronomy, soil science, nutrition, development studies, and environmental governance. Frequent references to FAO reports, CGIAR research programs, IFPRI publications, and IPCC assessments ensure that the analyses are situated within broader international debates.

Particularly noteworthy is the integration of African scholarship. While many publications on African agriculture rely predominantly on perspectives from the Global North, this volume provides substantial space for African researchers and locally generated evidence. This contributes significantly to the relevance and credibility of the analyses.

Comparison with Related Volumes

The volume may be compared with several recent works addressing food security, climate-smart agriculture, and sustainable development in Africa, including *Nutrition, Sustainable Agriculture and Climate Change in Africa* (Odularu, 2020), *Multifunctional Land Uses in Africa* (Simelton & Ostwald, 2019), *Towards Sustainable Food Production in Africa* (Fanadzo et al., 2023), and *Sustainable Agroecological Practices in Sub-Saharan Africa in the Face of Climate Change* (Otieno, 2024).

What distinguishes the present volume is its strong integration of nutrition, soil science, climate adaptation, and policy analysis. Unlike many comparable publications that focus primarily on agricultural productivity or climate-smart agriculture, this book consistently links food production to nutritional outcomes and human wellbeing. Its extensive use of empirical case studies, particularly from Malawi, also provides a level of contextual depth rarely achieved in broader regional overviews.

Critical Evaluation

The volume possesses numerous strengths, including its interdisciplinary scope, strong empirical basis, and policy relevance. The integration of natural and social sciences allows for a holistic understanding of food systems that reflects contemporary theoretical developments in sustainability science.

Nevertheless, certain limitations should be acknowledged. A substantial proportion of the empirical evidence originates from Malawi, which may constrain the generalizability of some findings to the wider Sub-Saharan African region. In addition, topics such as urban food systems, regional food trade, consumer behaviour, and food processing industries receive comparatively limited attention. These omissions do not diminish the value of the volume but suggest potential directions for future research and subsequent volumes.

Conclusion

Sustainable Food Systems in Sub-Saharan Africa: Plant Derived Nutritious Foods represents a substantial contribution to contemporary scholarship on food security, agricultural sustainability, and rural development. By integrating soil science, nutrition, climate adaptation, and policy analysis, the volume offers a comprehensive examination of the challenges and opportunities facing food systems in Sub-Saharan Africa. Its strong empirical foundation, multidisciplinary perspective, and practical relevance make it an important resource for researchers, graduate students, development practitioners, and policymakers seeking to understand and promote sustainable food systems in one of the world's most vulnerable yet dynamic regions.